Advanced Imaging for Characterization of Intestinal Metaplasia

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Abstract

Gastric intestinal metaplasia is clinically relevant because of its role in the process of gastric carcinogenesis. The current gold standard for the diagnosis of intestinal metaplasia is histology. It may be recognized on standard white-light endoscopy as whitish plaques, and a villous appearance may even be evident with high-definition white-light endoscopy without magnification. However, standard white-light endoscopy is generally suboptimal for endoscopic diagnosis because intestinal metaplasia usually appears in flat mucosa and shows few morphological changes. Techniques of image-enhanced endoscopy, especially in the setting of magnifying endoscopy with high definition, are useful in the detection of such lesions and will permit targeted biopsies. This video review will demonstrate the typical appearance of intestinal metaplasia on white-light endoscopy, with methylene blue chromoendoscopy and narrow-band imaging. This article is part of an expert video encyclopedia.

Keywords

Gastric intestinal metaplasia; Gastritis; Standard endoscopy; Video.

Video Related to this Article

Video available to view or download at doi:10.1016/S2212-0971(13)70048-7

Techniques

White-Light Endoscopy

After the gastroscope is inserted into the stomach, any overlying mucus is flushed away by rinsing with water, which is then aspirated. Alternatively, 0.04% simethicone solution has also been used for rinsing the mucosal surface. The antrum, incisura, and corpus are carefully examined. Gastric intestinal metaplasia will appear as mildly elevated whitish plaques. If a high-definition gastrovideoscope system is used, the villous surface may even be evident without the use of magnification.

Chromoendoscopy[1]

A spray catheter is inserted into the working channel of the gastroscope, extending 2–3 cm beyond the distal end of the gastroscope. Staining is performed by directing the spray catheter tip toward the mucosa and spraying 10–20 ml of the dye while rotating the shaft of the endoscope and simultaneously slowly withdrawing the endoscope. Indigo carmine at a concentration of 0.1–0.8% is used to provide contrast staining. It will make any mucosal surface irregularity (either erosions or elevations) more obvious, and when used in conjunction with optical magnification, will facilitate examination of the pit pattern of the lesion. Methylene blue is an absorptive dye that stains absorptive intestinal-type metaplasia of the stomach. After pretreating the mucosa with a mucolytic agent, spraying of 0.5% methylene blue is performed, followed by a dwell time of 1–2 min, and vigorously washing the excess dye with tap water until persistent blue staining remains. The areas of stained blue are the sites of intestinal metaplasia.

Narrow-Band Imaging

Narrow-band imaging (NBI) is available with both the Exera II and Lucera systems. The NBI mode is switched on simply by pressing a button on the gastroscope. The Lucera system will allow optical magnification, whereas the Exera II system permits digital magnification. Owing to darker illumination when the NBI mode is switched on, the tip of the gastroscope has to be moved closer to the gastric mucosal surface. In the newly launched Exera III system, the illumination is brighter and it is possible to visualize the mucosal surface clearly even from a distance. With NBI, areas of intestinal metaplasia will appear as bluish–whitish patchy areas. This is particularly useful because this may not be evident by white-light endoscopy at all. There may also be areas of light blue crest, which are blue-white lines visible on the epithelial surface. With further magnification, the villous appearance will be evident.

Equipment and Materials

- White-light endoscopy: any standard gastrovideoscope.
- NBI: Either the Exera II or Exera III systems or the Lucera system (Olympus Co., Tokyo, Japan). The Lucera system allows for optical magnification.
- Chromoendoscopy:
  - Indigo carmine: 0.1–0.8% solution.
  - Methylene blue solution: 0.5% solution.
- Spray catheter.

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Background and Endoscopic Procedures

Gastric intestinal metaplasia is clinically relevant because of its role in the process of gastric carcinogenesis, where it has been proposed that the intestinal type of gastric adenocarcinoma is the end result of progressive changes in the gastric mucosa. The gastric mucosa undergoes progressive changes from superficial gastritis, to multifocal atrophic gastritis, to intestinal metaplasia, to dysplasia, and finally adenocarcioma.[2] In a Japanese trial of 1246 patients with both *Helicobacter pylori* infection and intestinal metaplasia (IM) followed for a mean follow-up of 7.8 years, intestinal metaplasia was associated with a relative risk of 6.4.[3] A Dutch study assessed the role of IM in gastric cancer development in a cohort of 61 707 patients with intestinal metaplasia. The cumulative 10-year incidence of gastric cancer was 1.8%, with an estimated yearly incidence of 0.18%.[3] When so-called prevalent cases diagnosed within 10.8 months of follow-up were excluded, the 10-year incidence rate was 1.1% (0.11% yearly).[4]

The current gold standard for the diagnosis of intestinal metaplasia is histology. It may be recognized on standard white-light endoscopy as whitish plaques, and a villous appearance may even be evident with high-definition white-light endoscopy without magnification. However, standard white-light endoscopy is generally suboptimal for endoscopic diagnosis because intestinal metaplasia usually appears in flat mucosa and shows few morphological changes. Techniques of image-enhanced endoscopy, especially in the setting of magnifying endoscopy with high definition, are useful in the detection of such lesions and will permit targeted biopsies.

Indigo carmine chromoendoscopy is useful to outline any mucosal surface irregularity, and when used in conjunction with optical magnification, will facilitate examination of the pit pattern of the lesion. It is not specific to intestinal metaplasia. Methylene blue is an absorptive dye that stains absorptive intestinal type metaplasia of the stomach. Methylene blue staining with magnification endoscopy has been shown to detect gastric intestinal metaplasia and dysplasia with 84% and 83% accuracy, respectively.[5]

NBI facilitates examination of the mucosal surface without a need for chromoendoscopy. In NBI, a rotating interference narrow-band filter is interposed after the xenon light source, such that when the NBI mode is switched on, discrete blue and green wavelengths are used, and this facilitates visualization of mucosal details. Gastric intestinal metaplasia is recognized in NBI as bluish–whitish patchy areas. This is particularly useful because this may not be evident by white-light endoscopy at all. There may also be areas of light blue crest,[6,7] which are blue–white lines visible on the epithelial surface. The specificity of the light blue crest for intestinal metaplasia has been reported to range from 87%[7] to 93%.[6] With further magnification, the villous appearance will be evident. NBI has been reported to increase the detection rate of gastric intestinal metaplasia.[7]

Key Learning Points

- Before examination of the gastric mucosal surface, the mucosa should be rinsed to remove overlying mucus.
- When performing NBI using the Exera II system, the tip of the gastroscope should be brought close to the mucosal surface because of the dark illumination.
- To perform magnifying endoscopy with either chromoendoscopy or NBI, a disposable attachment should be fitted to the scope tip to maintain an adequate distance from the mucosa for magnifying observation.

Scripted Voiceover

Time (min:sec)	*Voiceover text*
0:00–0:20	Under white light endoscopy, obvious areas of mucosal irregularity are seen at the antral and incisural regions.
0:21–0:48	Using narrow-band imaging, these areas appear bluish-white, which is characteristic of gastric intestinal metaplasia.
0:49–0:57	Here, multiple, patchy, and flat erythematous lesions at the antrum are seen on white light endoscopy.
0:58–1:25	Narrow-band imaging demonstrates the typical bluish-white appearance of gastric intestinal metaplasia.
1:26–2:03	In this patient, subtle focal lesions are seen at the antrum and incisura.
2:04–2:43	Under narrow-band imaging, the characteristics of the lesions are accentuated. The classical bluish-white appearance of gastric intestinal metaplasia is depicted.

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Further Reading

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